Measuring Stormwater Pollution to Mississippi River

Mississippi River Forum

September 26, 2014

Presented by Mississippi Watershed Management Organization Staff

MWMO Headquarters
2522 Marshall Street NE
Minneapolis, MN 55418

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MISSISSIPPI WATERSHED MANAGEMENT ORGANIZATION

MWMO History

- MWMO draft Plan was published in December 1986, 2nd Generation Plan 2000, & 3rd Gen Plan in 2011
- MWMO is on the list of Special Taxing Districts (MS 275.066)
- First staff hired in 2002, currently 12 Staff

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MWMO History

- Current members are Columbia Heights, Fridley, Hilltop, Lauderdale, Minneapolis, MPRB, Saint Anthony Village and Saint Paul

- Original members included Falcon Heights and the University of Minnesota

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MWMO Programs

Planning

- Providing direction to MWMO's activities
- Collaborating with and supporting our member organizations

Watershed Assessment

- Developing a scientific base of knowledge
- Creating defensible stormwater standards
- Testing new technology

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MWMO Programs

Capital improvements

- Diagnostic and Feasibility Studies
- Greening
- Land Conservation
- Stormwater Infrastructure (BMPs)

Stewardship

- Professional Development and Training
- Community and Youth Outreach & Education
- Grants – Stewardship Fund: Mini, Planning and Action

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MWMO Programs

Water Resources Monitoring

- Collecting and analyzing water quantity and quality data
- Collecting baseline data and assessing pollutant levels
- Supporting science-based management
- Responding to current and emerging issues to reduce impacts to our water resources

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Water Resources Monitoring Staff

Udai Singh, PhD, PE - Water Resources Manager

Kari Oquist, MS – Water Resources Specialist

Brian Jastram, BS – Environmental Specialist

Jen Keville, MS – Environmental Specialist

Peter Swan, BS – Water Quality Assistant

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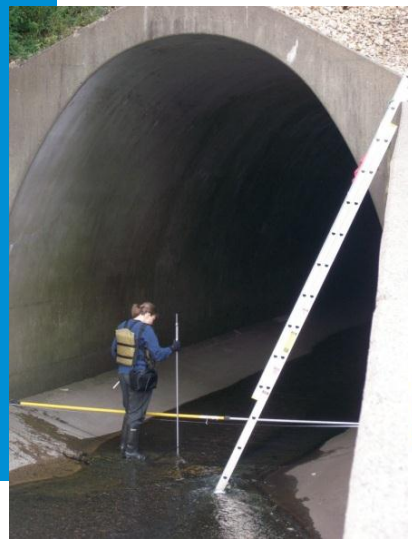
MWMO Monitoring Goals

Monitor water resources within the watershed

- Develop a record of baseline data to use for management decisions
- Assess pollutants listed on the Minnesota Impaired Waters list for the TMDL process

Assess the volume and rate of water movement in the watershed

Assess land use impacts on water quality



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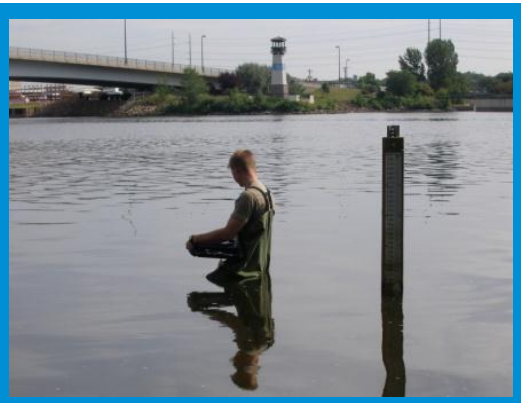
Water Resources Monitoring Program Overview

- Precipitation monitoring network
- Weather Station
- Stormwater outfall monitoring
- River monitoring for Bacteria TMDL
- Wetland Monitoring (Kasota Ponds)
- Lake Monitoring
- River monitoring for hydraulic mixing
- Data management
- Pollutant loading calculations
- Report writing
- Partnerships (U of M, MPCA, Met Council, Member Cities, MPRB, MnDOT, Anoka Conservation District, Xcel Energy, Minneapolis Public Schools)



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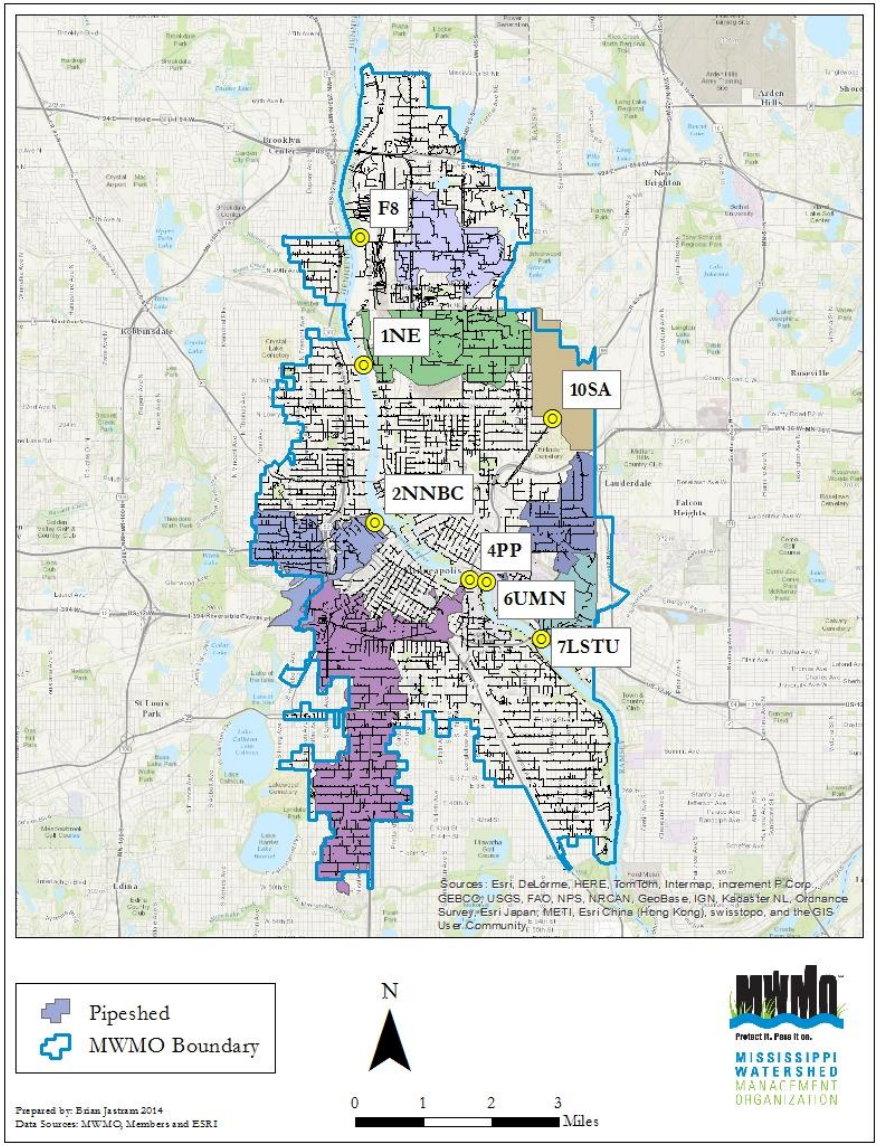
MWMO Watershed ~ Pipeshed

The watershed is unique in many ways:

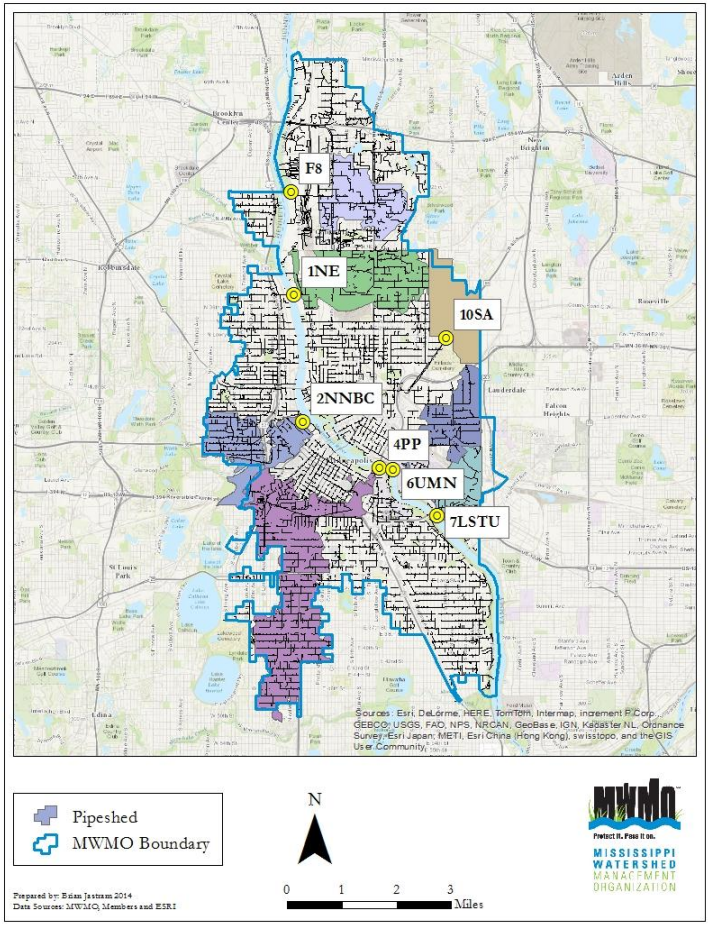
- Does not contain surface water tributaries
- Tributaries are contained in underground stormwater pipes



PPI
IED
MANAGEMENT
ORGANIZATION

MWMO Stormwater Outfall Monitoring Sites

- Selected largest subwatersheds for monitoring
- Pipe sizes range from 4.5 feet to 14 feet in diameter
- Pipe shapes: round and irregular
- 6 sites are automated with flow-paced composite sampling



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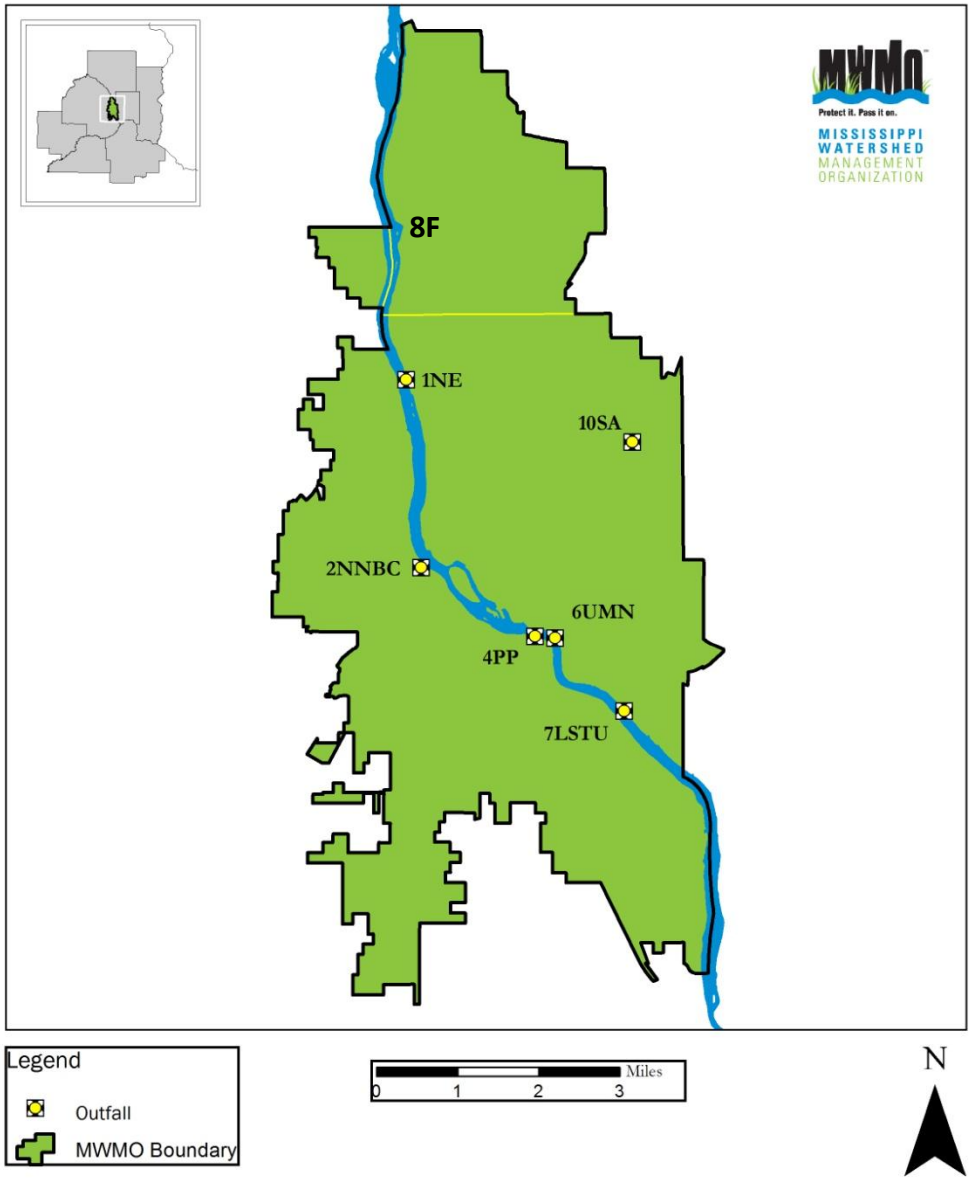
MWMO Outfalls



Created by: Brian Jastram MWMO 2012
Data Sources: MWMO and DNR

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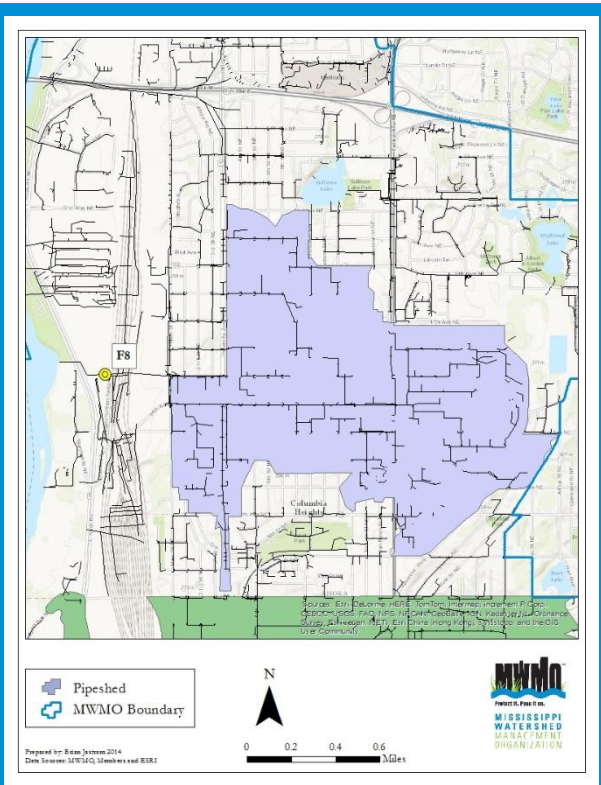
Stormwater Outfall Monitoring Site: 8F (45th Ave Stormwater Outfall)



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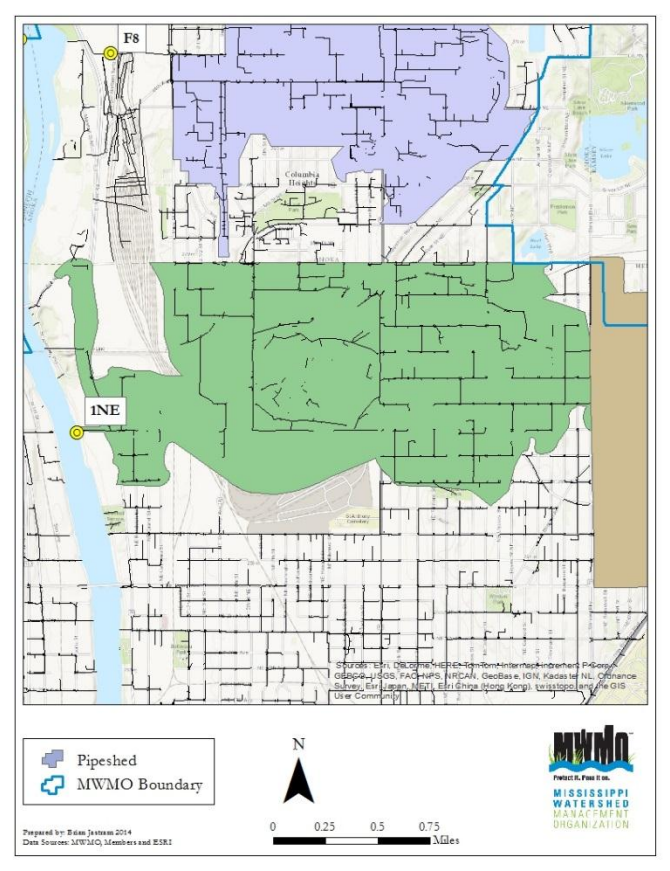
Stormwater Outfall Monitoring Site : 1NE (Xcel Riverside)



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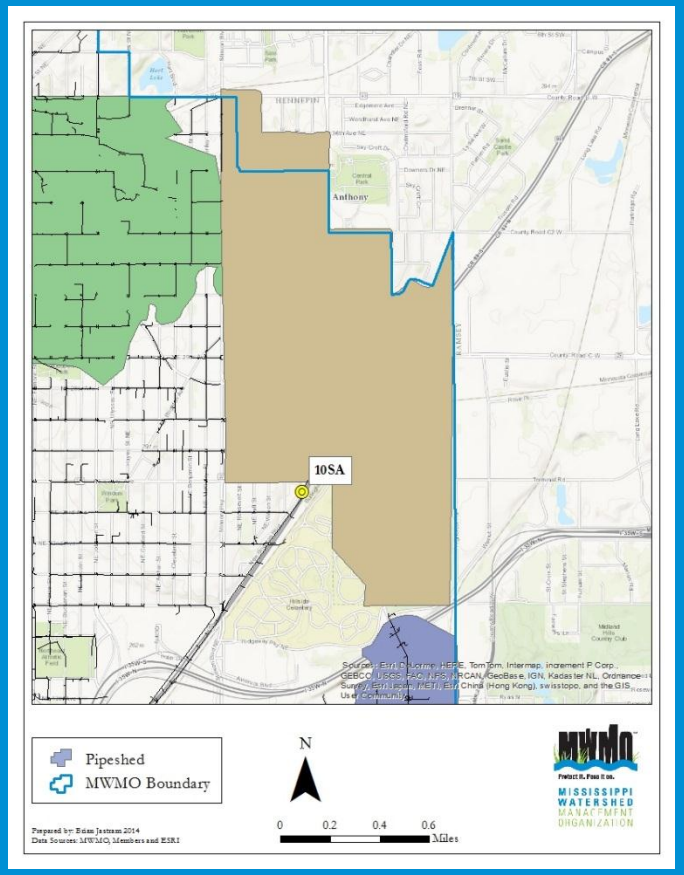
Stormwater Outfall Monitoring Site: 10SA (St. Anthony Village)



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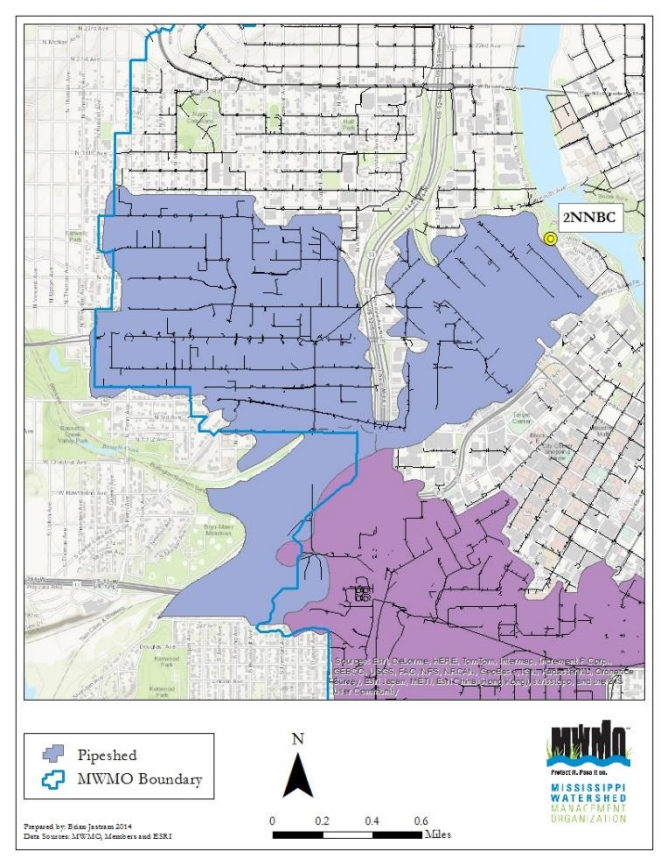
Stormwater Outfall Monitoring Site: 2NNBC (Old Bassett Creek Tunnel)



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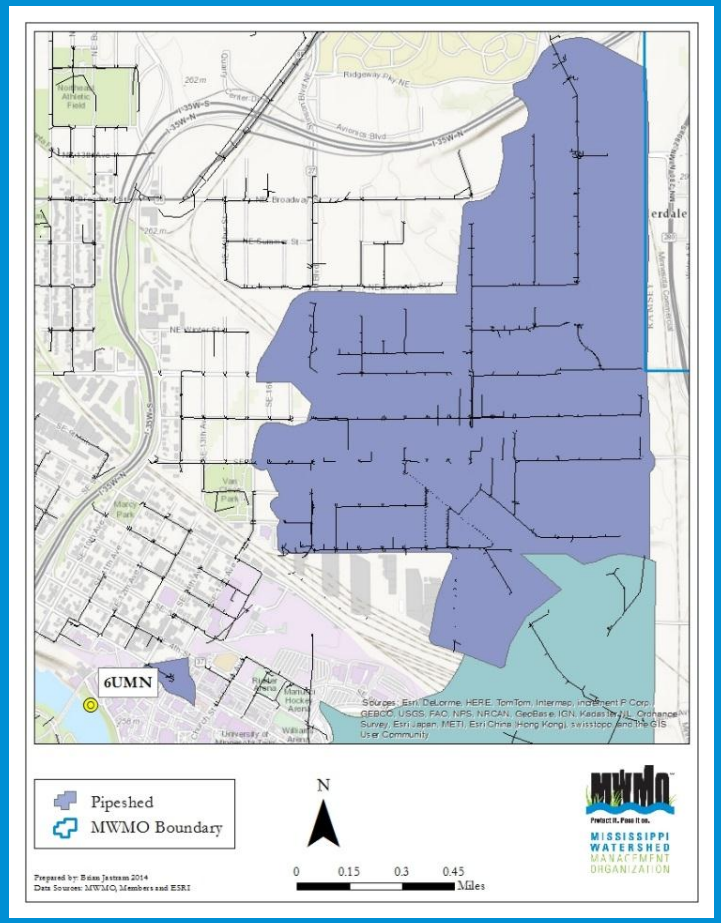
Stormwater Outfall Monitoring Site: 6UMN (Como)



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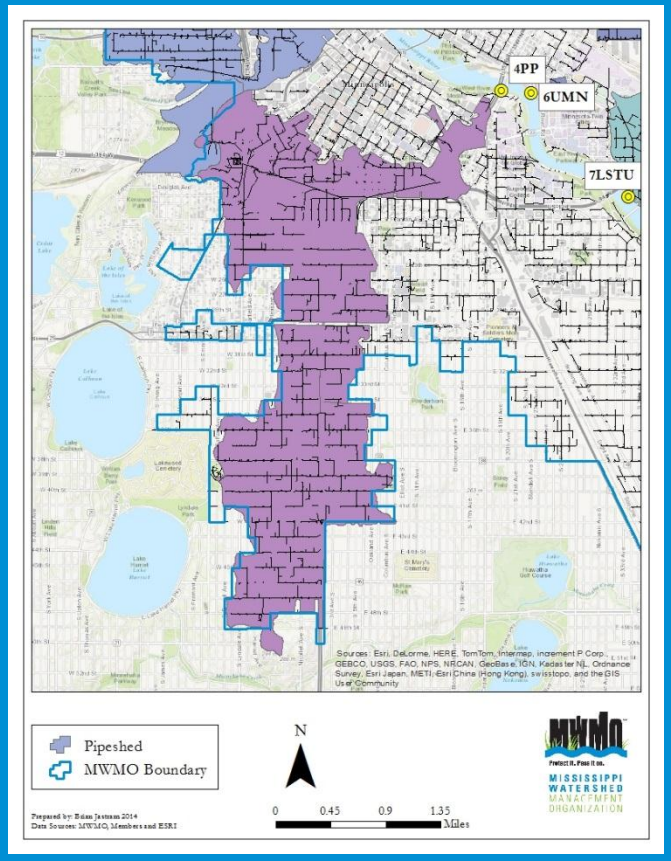
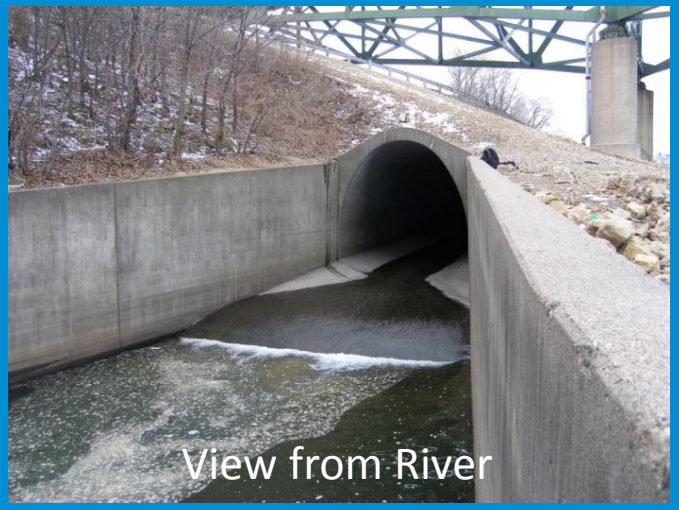
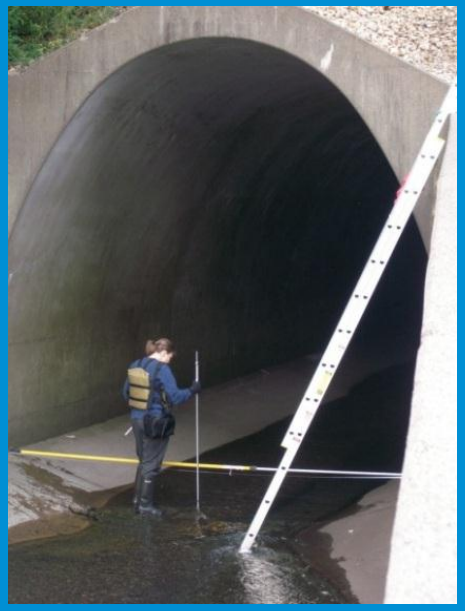
Stormwater Outfall Monitoring Site: 4PP (I-35W)







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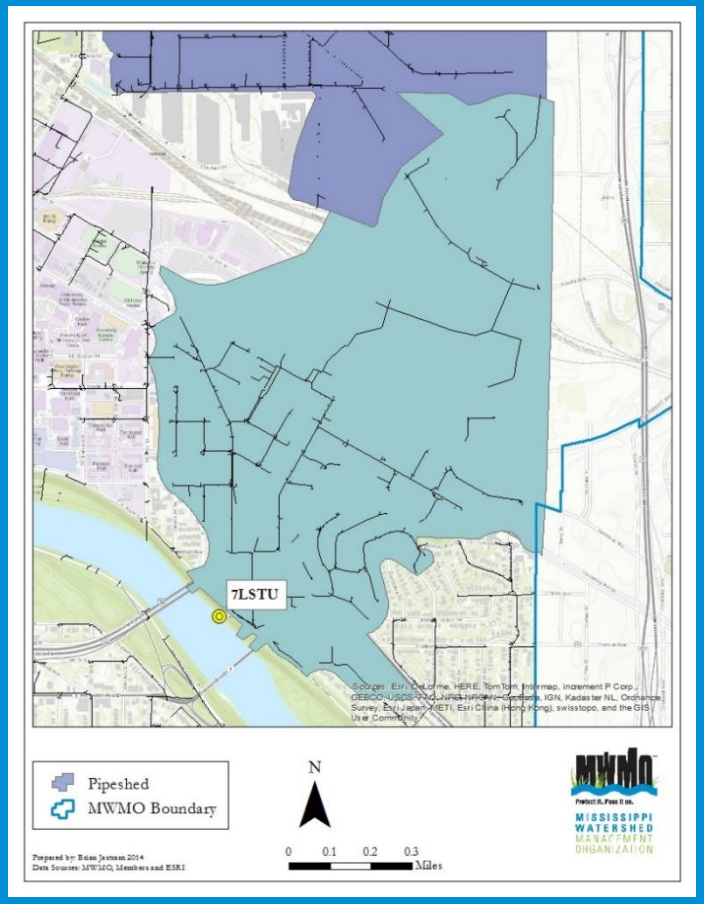
Stormwater Outfall Monitoring Site: 7LSTU (Bridal Veil)



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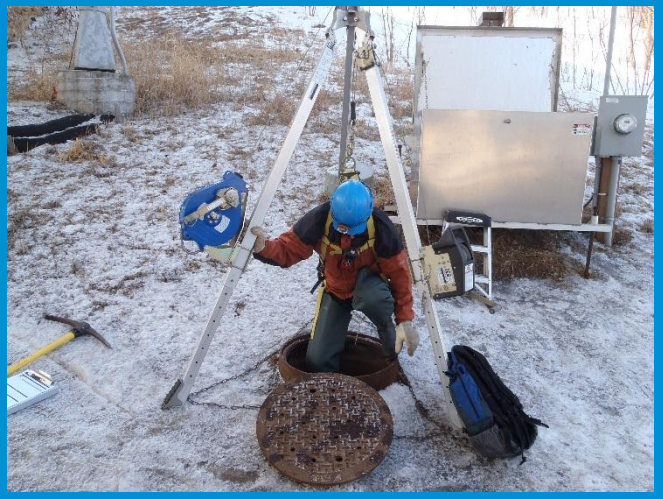
Confined Space Entry



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Outfall Monitoring Instrumentation

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Outfall Monitoring Instrumentation

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Stormwater Outfall Sampling Frequency

Year-round Monitoring

Rainfall: March – October

- 2 baseflow/month, at least 3 storms/month

Winter: November – February

- 1 baseflow/month, reduced parameters
- Snowmelt: whenever it occurs
- Rainfall: if it happens

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MWMO Sampling Parameters

Basics

- Temperature, pH, Dissolved Oxygen, Specific Conductivity, Salinity

Bacteria- *E. coli*

Metals

- Copper, Nickel, Cadmium, Lead, Zinc, Chromium, Mercury

Nutrients

- Total P, Dissolved P, Ortho-P, TKN, Total Ammonia N, Nitrate-N and Nitrite-N

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MWMO Sampling Parameters

Sediment

- Total SS, Volatile SS, Total Dissolved Solids

Oxygen Demand

- Total Chemical Oxygen Demand, Total 5-day BOD, Carbonaceous BOD (5-day)

Petroleum Products

- Oil and Grease, VOCs

Others

- Chloride, Fluoride, Sulfates, Alkalinity, Hardness, Total Organic Carbon

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MWMO Real-time Monitoring

View of the Mississippi River from a repeater antenna

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Real-Time Monitoring Diagram

Radio

Site antenna

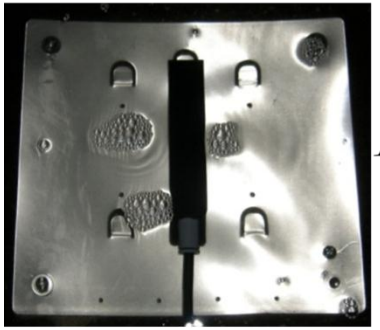
SAFL antenna

Radio

Data Logger

Server

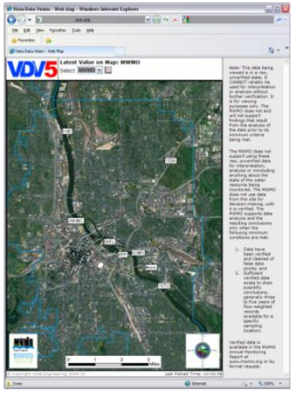
Water Sampler



Area Velocity Meter

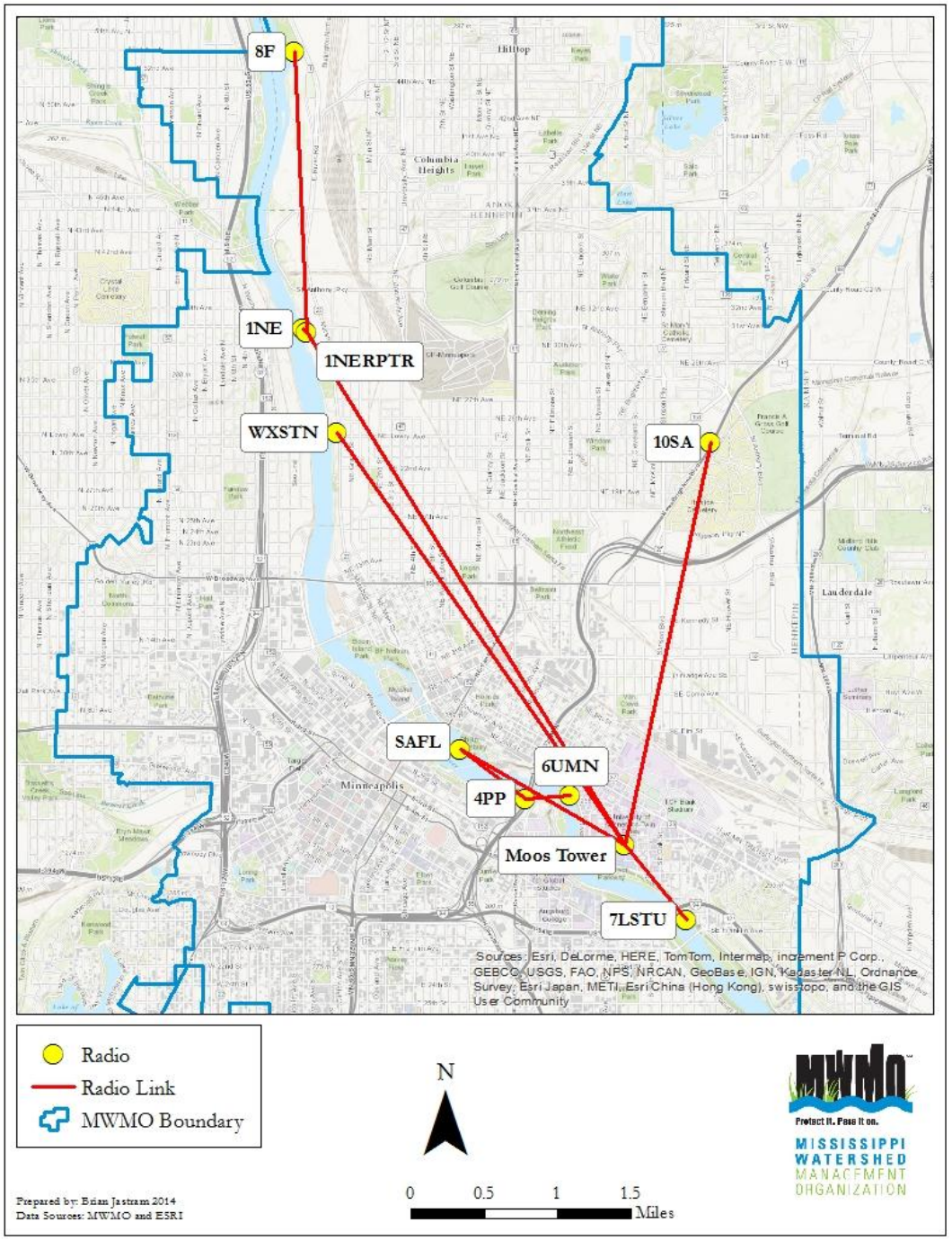
Base Station

Internet



Remote Data Access Network for Outfall Monitoring

- Radio network
- Vista Data Vision (VDV)
- With VDV we can visualize and download site data for:
  - Level
  - Flow
  - Velocity
  - Battery voltage
  - Conductivity
  - Rainfall
  - Weather
  - Samples collected



MWMO Real-time Monitoring Objectives

Increase efficiency of stormwater monitoring

- Eliminate unnecessary trips to sites
- Real-time notification of equipment maintenance needs

Provide timely information for MWMO's member organizations

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Things to Consider

Cost-effective?

- Equipment
- Contract
- Software
- Short-term or long-term sites

Telemetry method

- Cell phone
- Wireless
- Radio/antenna

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Radio Telemetry

Best option for site conditions

Challenge: Line of sight between antennas

- Repeater antennas
- Get up HIGH!

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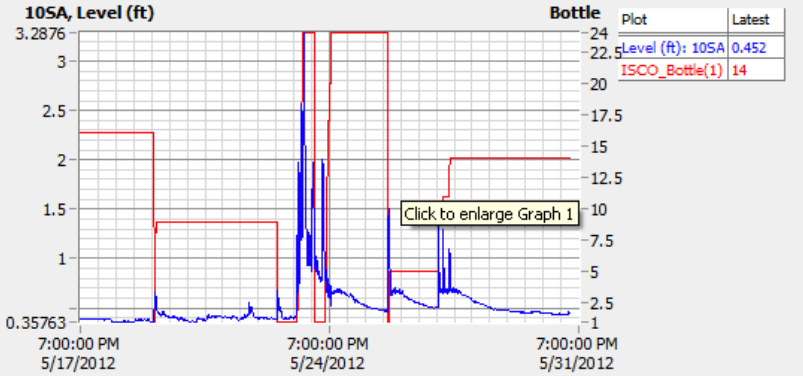
Pages

- System Status
- ISCO Sample Bottle Log
- Datalogger Panel Temps

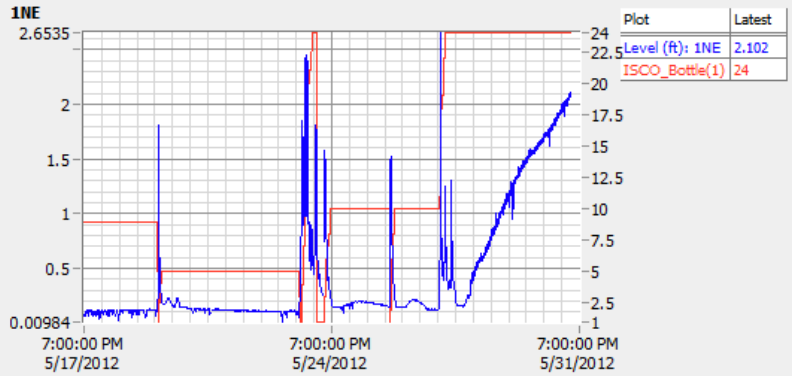
Sites

- 10SA
- 1NE
- 2NNBC
- 4PP
- 6UMN
- 7LSTU
- MWMO - Admin
- SAFL Weather

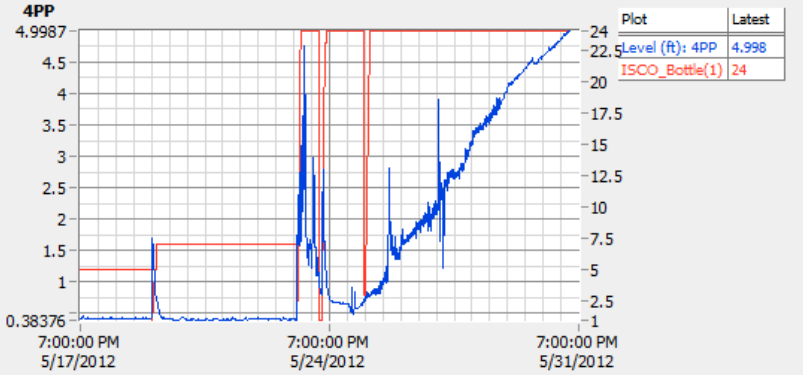
MWMO - Admin: ISCO Sample Bottle Log



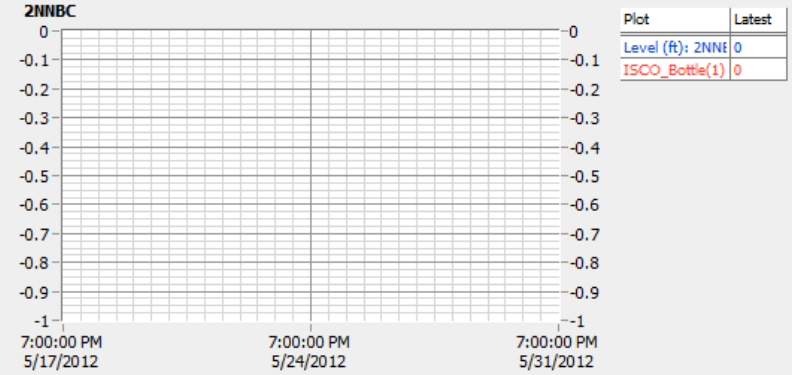
Plot	Latest
Level (ft): 10SA	0.452
ISCO_Bottle(1)	14



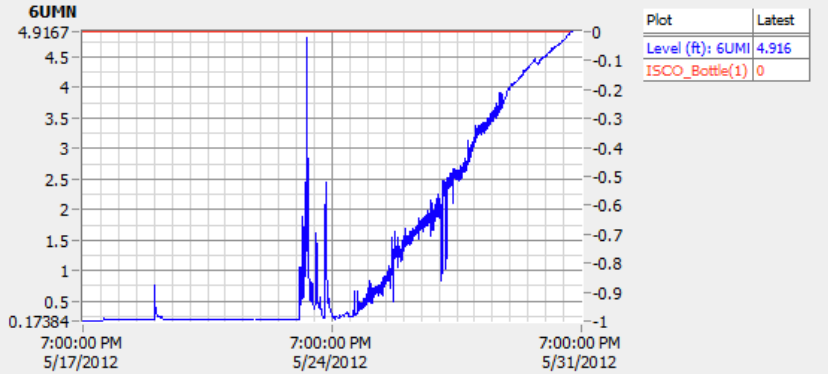
Plot	Latest
Level (ft): 1NE	2.102
ISCO_Bottle(1)	24



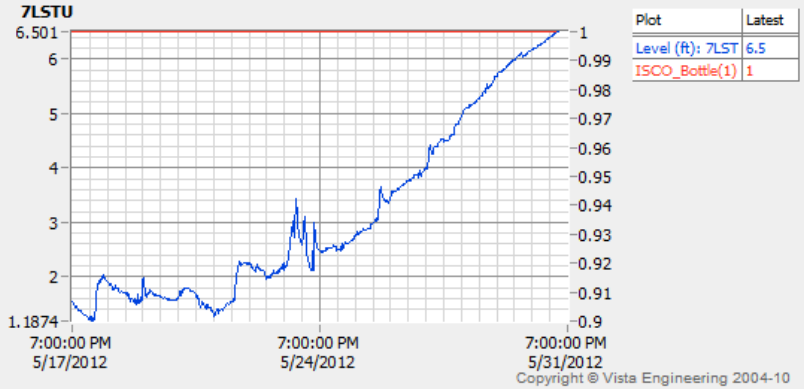
Plot	Latest
Level (ft): 4PP	4.998
ISCO_Bottle(1)	24



Plot	Latest
Level (ft): 2NNI	0
ISCO_Bottle(1)	0



Plot	Latest
Level (ft): 6UMI	4.916
ISCO_Bottle(1)	0



Plot	Latest
Level (ft): 7LST	6.5
ISCO_Bottle(1)	1

Note: This data being viewed is in a raw, unverified state. It CANNOT reliably be used for interpretation or analysis without further verification. It is for viewing purposes only. The MWMO does not and will not support findings that result from the analysis of the data prior to its minimum criteria being met.

MWMO Weather Station

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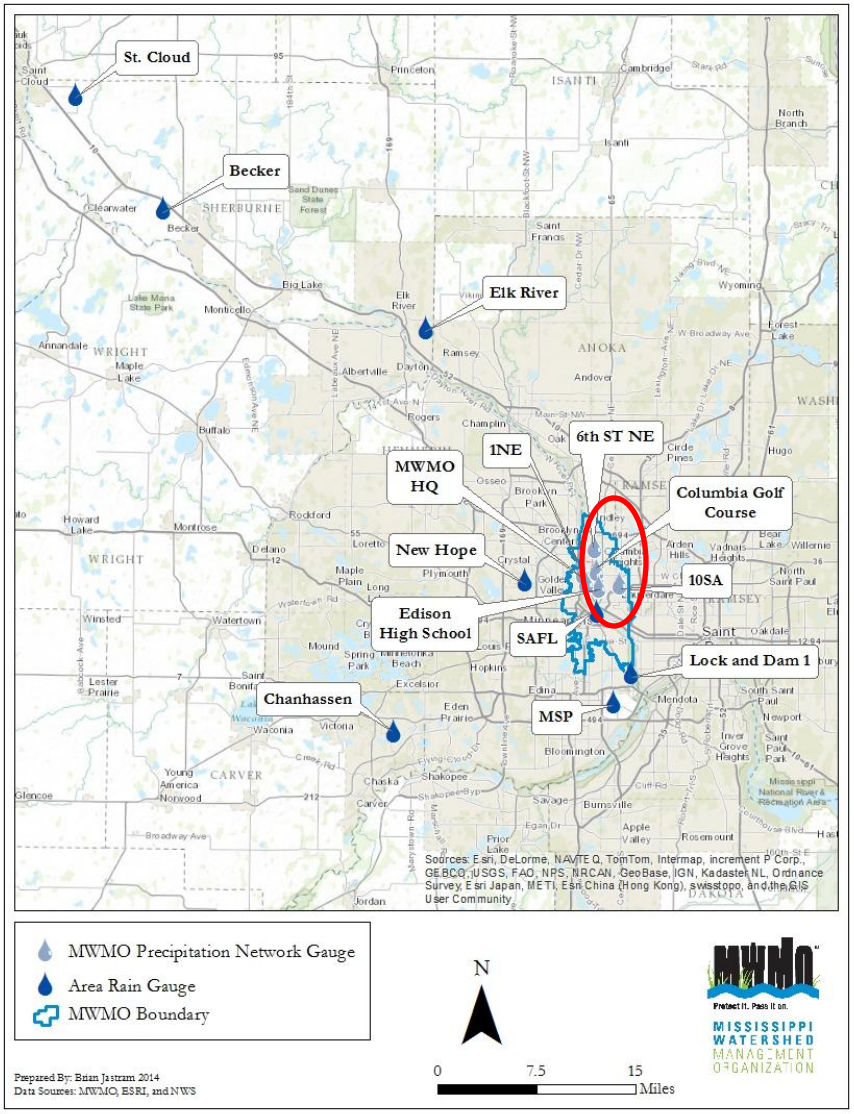
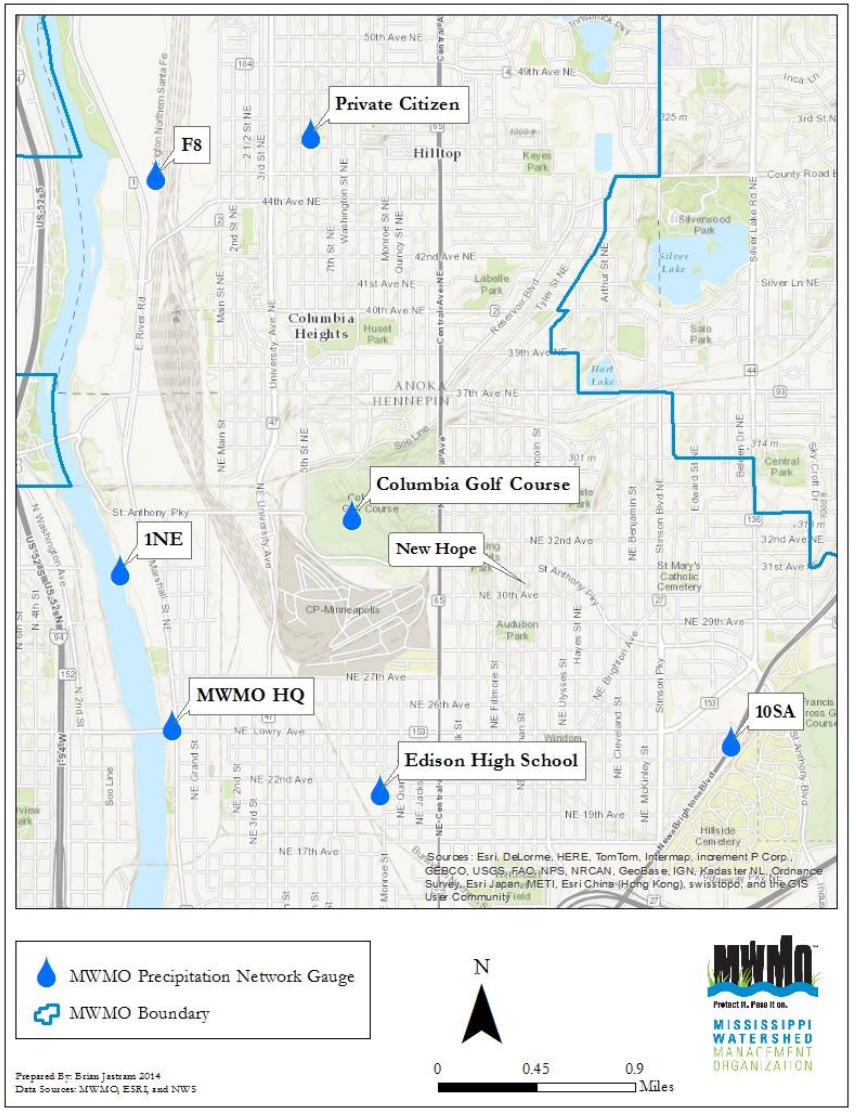
Northeast Minneapolis Precipitation Network





Mississippi River Monitoring for Bacteria TMDL (Total Maximum Daily Load)

- 7 river sampling locations, 7 stormwater outfall/tunnel locations
- 2 base samples per month, at least 3 rain event samples per month
- Samples analyzed for *E.coli* and physical parameters (water temperature, DO, pH, etc.)

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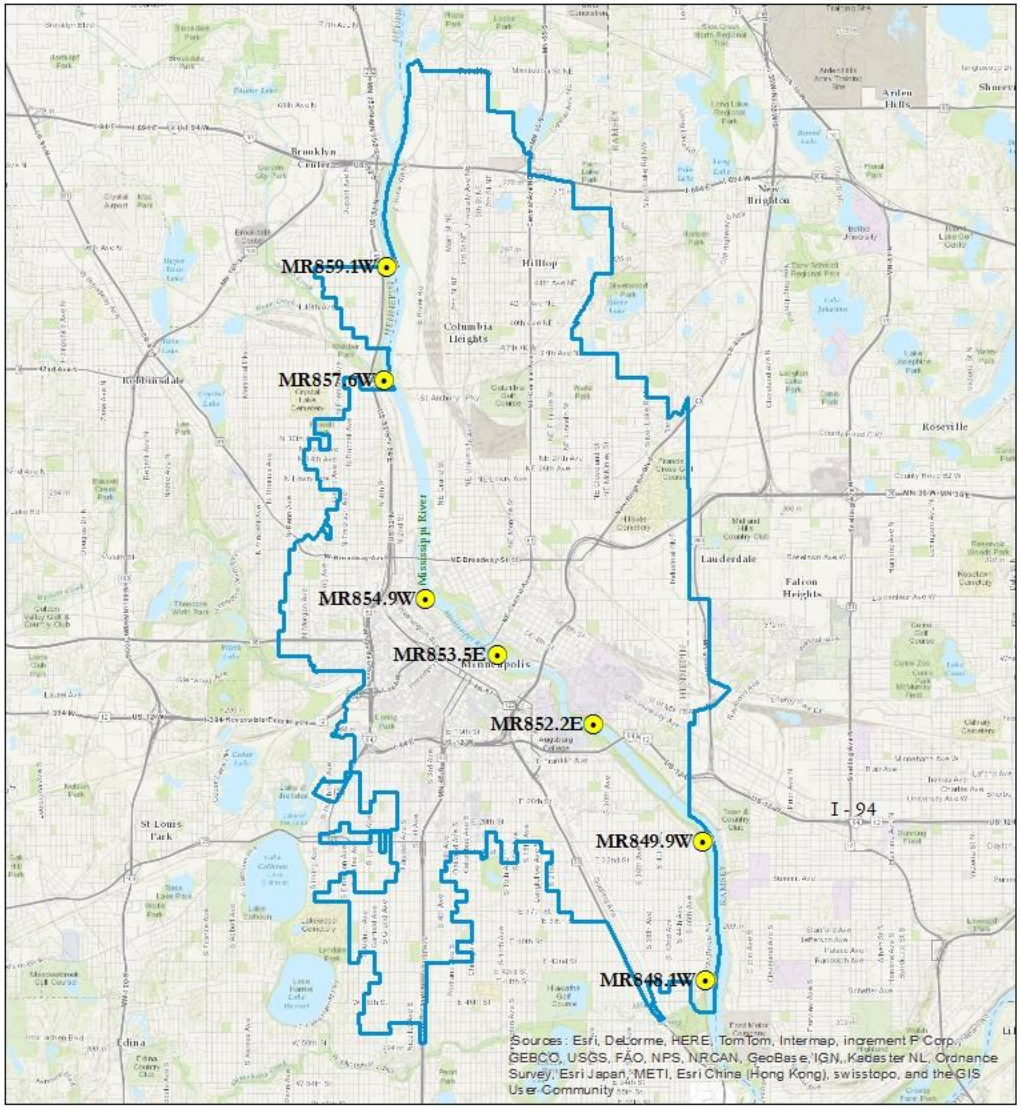

River Monitoring Site

MWMO Boundary

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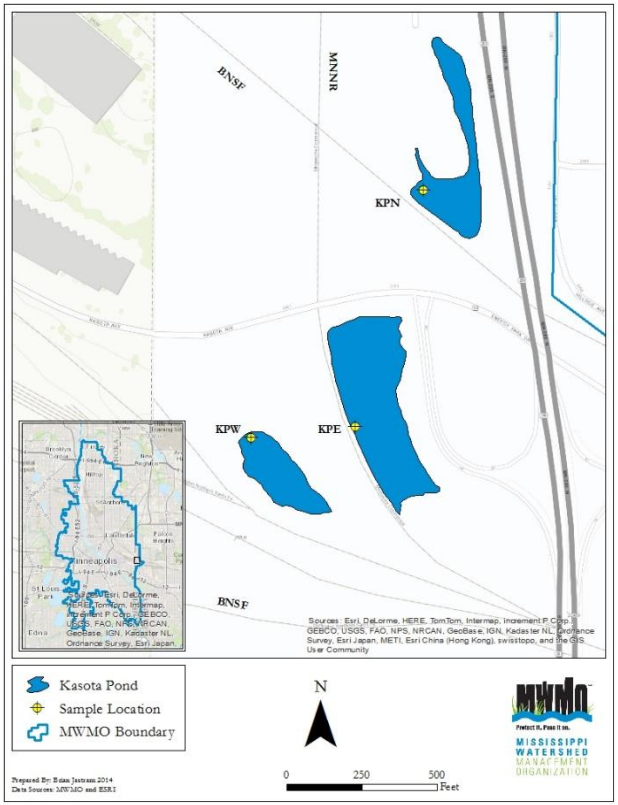
0 1 2 3 Miles

Prepared by: Brian Jastram 2014
Data Sources: MWMO, MNDNR, USGS, ESRI, and Metro GIS

Wetland Monitoring (Kasota Ponds)

- 3 sites sampled once/month, year round
- Water quality analysis
  - Chlorides
  - Metals
  - Nutrients
- Biological sampling completed in 2011



River Mixing Study Project

Working to develop monitoring protocol based on data collected regarding hydraulic and pollutant mixing in the river

Building relationships and collaborating with USGS, National Park Service, Met Council, and US Army Corp of Engineers

First phase of the project for last two seasons

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Partners, Data, and Loading Calculations

Partners

- MPCA (Bacteria and chloride TMDLs)
- City of Minneapolis (NPDES, Bassett's Creek project)
- Saint Anthony Village (gas, truck maintenance, some monitoring)
- SAFL (VDV, radio network)

Data Management and Organization

- Continuing efforts to build Access databases
  - Bacteria database completed 2011
  - Stormwater database in progress
- Cleaning hydrological data, managing WQ data
- Data requests
- EQuIS
  - All stormwater, river and wetland data is submitted

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Questions?

Installing sensor cable at 4PP

Bacteria sampling near Lake Street Bridge

Compositing a sample at 10SA

Repair and maintenance at 6 UMN

Regular maintenance during winter